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ABSTRACT

Six brief papers on mnemonics are given, with emphasis on increasing learning and memory skills of learning disabled students: Papers have the following titles and authors: "History of Mnemonics from Classical Times to Present" (J. Johnson); "The Keyword Method and the Keyword Vocabulary Method: (M. Prater); "Learning Attributes via Mnemonic Instruction" (J. Gaffney); "Transfer of Mnemonic Instruction" (B. McLoone); "Extended Mnemonic Instruction" (D. Tolfa); and "Future Applications of Mnemonics with Learning Disabled Students" (M. Mastropieri and T. Scruggs). (JW)

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Increasing Learning and Memory Skills* of Learning Disabled Students

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History of Mnemonics from Classical Times to Present

Judith I. Johnson
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The Keyword Method and the Keyword Vocabulary Method

Mary Anne Prater
Utah State University

Learning Attributes via Mnemonic Instruction

Janet S. Gaffney
University of Mississippi

Transfer of Mnemonic Instruction

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Extended Mnemonic Instruction

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Future Applications of Mnemonics with Learning Disabled Students

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*Session/Papers presented at the annual meeting of the Council for Exceptional Children, Anaheim, April, 1985.

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HISTORY OF MNEMONICS FROM CLASSICAL TIMES TO PRESENT*

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The Greeks considered memory an art in which "places" and "things" were impressed on the mind. At a banquet given by a nobleman (around 500 B.C.), the poet Simonides chanted a poem in honor of his host, but included passages in praise of the twin gods Castor and Pollux. His host told him that he'd only pay him half of the sum agreed upon, and he could collect the other half from the gods. Simonides was called out of the room by two young men (thought to be the gods), and during his absence the roof collapsed, crushing all of the guests to death. Simonides remembered the places at which people were sitting and was able to identify the bodies to the relatives.

The art of memory belonged to rhetoric as a technique by which an orator (an important career during early years) and a storyteller (oral history) could improve his memory and enable him to deliver long speeches or stories with flawless accuracy.

The first step was to imprint on the memory a series of "loci" or places. The most common type of mnemonic place system used was the architectural type. The ancient orator moved through his memory building while making his speech. The opening thought would be associated with the entryway, the second thought the foyer, the third to a piece of furniture in the foyer, etc. It was essential that the places should form a series and be remembered in order so that one could start from any "locus" and move backwards or forwards from it. The phrases "in the first place," "in the second place," etc. come from this "loci" memory technique.

The orators and storytellers learned rules for memorizing "things" (the subject matter of the speech) and "words" (the language in which the subject matter was presented). Words were memorized by placing human figures of unusual character and in striking situations in one's mind because it was assumed that the bizarre and novel were remembered for longer periods of time.

Simonides (around 500 B.C.) has been called the father of the art of trained memory. Cicero (around 400 B.C.) was a great early teacher of it, and during the Middle Ages Thomas Aquinas considered trained memory a religious duty. Peter of Ravenna wrote The Phoenix in 1491 and brought the mnemotechnique to the common people. During the fifteenth and sixteenth centuries, many books were written on it. Shakespeare used memory systems in his Globe Theater - called the "memory theater," and philosophers of the seventeenth century taught memory systems. Unfortunately, the techniques fell into disuse for centuries.

In the early 1900's, Luria, a Russian psychologist, studied and wrote of his Subject "S" who had an incredible capacity for remembering information. Subject "S"'s skills were initially viewed as unusual, while later on as remarkable. Psychologists and educational researchers really only began to study "memory" and "memory-enhancing devices" (mnemonic strategies) in the 1960's and 1970's.

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*Paper presented at the annual meeting of The Council for Exceptional Children, Anaheim, April 1985.

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THE KEYWORD METHOD AND THE VOCABULARY KEYWORD METHOD*

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A specific mnemonic device found to be successful in teaching students vocabulary is entitled the "keyword" method (Atkinson, 1975). Involved in this approach are what Levin (1983) calls the 3 R's: recoding, relating and retrieving.

During the recoding stage an unfamiliar word (the vocabulary word to be learned) is transformed into a "keyword". The keyword should be a familiar word, acoustically or orthographically similar to the unfamiliar word. It will also help if the word is a concrete object that's easily visualized. For example, 'ranid' means 'frog'. A word that's familiar to the student, sounds like 'ranid' and is easy to visualize is 'rain'.

Next, the student relates the keyword to the meaning of the vocabulary word through an interactive picture. Therefore, in our example, the 'frog' (the meaning of ranid) could be pictured sitting in the 'rain'. The final step involves retrieving the meaning, 'frog', from the vocabulary word, 'ranid'. During this process, when asked what 'ranid' means, the student thinks of 'rain', which leads to the interactive picture of the rain and the frog. Thus, the student is afforded a direct link to the desired response, frog.

These three associative mnemonic R's, recoding, relating and retrieving, provide an extremely potent vocabulary-learning strategy. These techniques have been used successfully across a variety of content areas, including: (a) English vocabulary learning and (b) foreign language vocabulary learning, such as Italian, Spanish and Russian. Also, these techniques have been effective with a variety of students, including (a) educationally mentally retarded, (b) learning disabled, (c) 'normal', and (d) gifted (Mastropieri, Scruggs & Levin, in press).

In summary, the vocabulary keyword method has been successful across a variety of content areas and with various handicapping, normal and gifted populations. The future potential of this strategy is just beginning to be explored.

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*Paper presented at the annual meeting of the Council for Exceptional Children, Anaheim, California, April 1985.

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Mastropieri, M. A., Scruggs, T. E. & Levin, J. R. (in press) Maximizing what exceptional students can learn: A review of research on the keyword method and related mnemonic techniques. Remedial and Special Education.

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Attribute Learning Via Mnemonic Instruction[1]

Janet S. Gaffney
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The keyword method (Atkinson, 1975) has been demonstrated to be an effective and efficient mnemonic technique for facilitating the recall of vocabulary-word meanings by mildly handicapped learners. This associate memory strategy incorporates Levin's (1983) "three R's" of stimulus recoding, semantic relating, and systematic retrieval (p.222). In the recoding stage, an unknown vocabulary word (stimulus) is transformed by linkage with an acoustically-similar familiar or meaningful term (Keyword). In the relating stage, elaboration occurs when the learner is provided with a picture or generates an image that constructs an interaction between the keyword (recoded stimulus) and the meaning of the unfamiliar word. Finally, the learner systematically retrieves the meaning of the unfamiliar word by association with the keyword, which in turn evokes the interactive picture, and results in the recall of the desired definition. In vocabulary studies that compared the effectiveness of the mnemonic keyword and direct instruction methods, learning disabled (LD) adolescents (Mastropieri, Scruggs, Levin, Gaffney, & McLoone, 1985) and educable mentally retarded (EMR) students (Scruggs, Mastropieri, & Levin, in press) instructed mnemonically recalled significantly more definitions than students who received direct instruction.

Single Attribute Learning

Based on the success of the mnemonic keyword strategy in the acquisition of vocabulary definitions, this technique was combined with "pegwords" to facilitate the learning of numbered or ordered information. Pegwords are easily pictured referents that rhyme with numbers 1 through 10 (e.g., 1 is bun, 2 is shoe, 3 is tree, 4 is floor, etc.). The

[1]Paper presented at the Annual Convention of the Council for Exceptional Children, Anaheim, CA, April 19, 1985.

combination keyword/pegword strategy has been used to assist students in learning the hardness levels of minerals (e.g., bauxite is 1 on the hardness scale). For this strategy, students were first taught the rhyming pegwords for the numbers 1 through 10 (recall that the pegword for "1" is bun) and then keywords for each of the mineral names (e.g., box is the keyword for bauxite.) Finally, students were shown an interactive illustration of the keyword for each mineral with its associated pegword. As depicted in Figure 1, the interactive illustration for bauxite is a box (keyword) full of buns (pegword). Thus when the student is asked, to recall the hardness level of bauxite, the learner recalls that the keyword for bauxite is box, thinks back to the picture with a box in it, remembers that the box if full of buns, recalls that bun stood for 1, and responds with the appropriate hardness level, 1.

The application of the keyword/pegword strategy to learning the hardness levels of minerals has been demonstrated to be extremely effective for LD adolescents both in immediate and 24-hour delayed recall tests (Mastropieri, Scruggs, & Levin, in press-c). In addition, the keyword/pegword technique has produced superior results for both LD students taught in small groups (Experiment 1) and EMR students (Experiment 2) in comparison with direct instruction (Mastropieri, Scruggs, & Levin in press-a).

The success of the keyword/pegword strategy for facilitating recall of single attributes by mildly handicapped learners has tremendous implications for special education teachers. First, this attribute task is more complex than the vocabulary definitions because the combined strategy requires two stimulus transformations, one for the keyword and one for the pegword (Mastropieri, Scruggs, & Levin in press-b). Second, the strategy has been applied to a content area, in this case science. Recall of facts is a prerequisite for more difficult tasks and required for success in school. Finally, the use of the keyword/pegword strategy in small groups approximates more closely instruction that occurs in classrooms and is a more efficient use of learning time.

Multiple Attribute Learning

In the single attribute studies previously reviewed, mildly handicapped students were provided instruction on the hardness levels of 14 target minerals. Scruggs, Mastropieri, Levin, & Gaffney (in press) taught LD junior high-school students the three attributes of hardness level, color, and use of 8 target minerals. Thus, the student would be able to learn not only that wolframite has a hardness level of 4 but also that it's black in color, and used for light bulbs. Similarly to the hardness level task, LD students who were instructed mnemonically first learned the keywords and pegwords for all 8 minerals. For example, the students learned that the keyword for wolframite is wolf, and that the pegword for 4 is floor. The students were then shown an illustration of a wolf interacting with its hardness level, color, and use. For wolframite, the students were shown a picture of a black wolf standing on a floor lit up by light bulbs (see Figure 2).

The relative effectiveness of this mnemonic strategy was compared to free-study and direct-instruction methods. Three other groups of LD students were included in the study. Students were presented the full list of minerals and attributes as an independent study task (free study) or using direct-instruction procedures (full-list direct-instruction). The final group was presented half of the minerals and attributes through direct instruction procedures (reduced-list direct-instruction). The reader should note that the instructional time was held constant across conditions. Students in the mnemonic condition significantly outperformed students in the other two full-list conditions. Moreover, the mnemonic students recalled approximately 17 (24 possible) attributes compared to the 6 (12 possible) recalled by students presented the reduced list via direct-instruction in the same amount of time. These findings support the superiority of mnemonic techniques for recall of discrete facts as demonstrated in previous research and extends the use of technique from single to multiple attributes. The effectiveness of

this mnemonic strategy with multiple-attribute learning has greatly expanded the potential for curricular adaptations in content-subjects for mildly handicapped learners.

In a second study, a variation of multiple-attribute learning was investigated with LD adolescents (Mastropieri, Scruggs, McLoone, & Levin (in press). The three attributes of minerals were presented as dichotomous classifications of hardness level (hard-soft), color (dark-pale) and use (home-industry). In the mnemonic illustrations, the keyword objects were blackened (dark) or non-blackened (pale) and depicted interacting with an old man or a baby (soft) in either a home or factory setting (symbolic of use). For example, the keyword for apatite is ape. The illustration for apatite is presented in Figure 3. The ape is blackened (dark) is interacting with a baby (soft) and presented as a factory scene. Students were asked to remember the picture of a dark ape swinging with a baby in a factory. When compared with direct instruction and free study methods, mnemonic instruction was superior to free study which, in turn, exceeded direct instruction.

Taxonomic classification in content areas often require discriminations between dichotomous attributes, such as, warm-blooded vs. cold-blooded animals, industrial vs. agricultural states, and fact vs. opinion statements. The results indicate that the application of this mnemonic strategy to learning multiple dichotomous attributes of other concepts will provide substantial benefit for LD students.

Even more recently, a two-experiment study was conducted to compare the effectiveness of mnemonic instruction with a revised direct instruction condition that incorporated the use of visual-spatial displays. In Experiment 1, LD junior-high students were presented multiple attributes of minerals as specific or discrete values as described in Scruggs, Mastropieri, Levin, and Gaffney (in press). In Experiment 2, intermediate-grade LD students learned multiple attributes of minerals presented in a dichotomous fashion as described in Mastropieri, Scruggs, McLoone, & Levin (in press). In both experiments, the students in the mnemonic

condition outperformed students in both visual-spatial and free-study conditions. The performance of students in the latter two conditions was not significantly different.

The consistent findings of superior performance for mildly handicapped students instructed mnemonically has tremendous implications for classroom instruction. The expansion of the use of the mnemonic technique from single-to multiple-attribute learning of both specific values and dichotomous classifications, provides a technique with numerous applications to the content areas.

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BAUXITE
box

One
bun

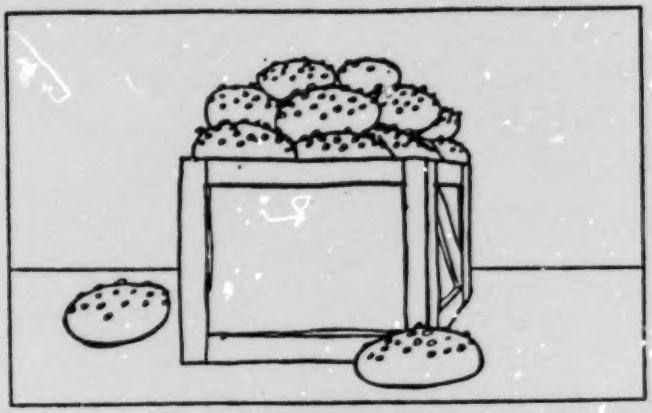

Figure 1

WOLFRAMITE (wolf)

Hardness Level 4 (floor)
BLACK Color
Used for LIGHT BULBS

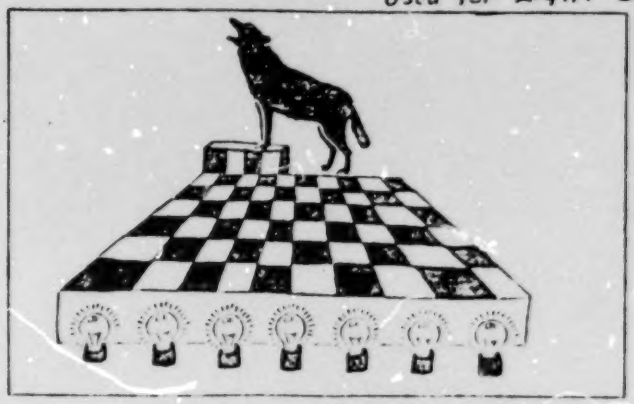

Figure 2

Apatite (ape)

SOFT Mineral (baby)
DARK Color
Used in INDUSTRY

Figure 3

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TRANSFER OF MNEMONIC INSTRUCTIONS*

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Arizona State University

Previous researchers have demonstrated the robust effects of mnemonic-keyword strategies and variations of those strategies on recall performance of nonhandicapped as well as exceptional learners with a variety of tasks (see McLoone, 1985, for a review). Researchers have further demonstrated that proficient adult learners do not spontaneously generate such mnemonic strategies, indicating these strategies must be instructed. Given that (1) mnemonic strategies are efficient and effective in enhancing recall performance, and (2) these strategies must be taught, logical questions of educational interest arise. For instance, if instructions in mnemonic strategies are delivered for particular memory tasks, will students transfer those strategies to other tasks? And, how much additional prompting and/or training will be necessary to produce such strategy transfer for different populations of students?

The following discussion considers two investigations that address this critical issue of strategy training and strategy transfer. Pressley and Dennis-Rounds (1980) investigated mnemonic strategy transfer with nonhandicapped 12- and 18-year old students. Their investigation involved two tasks. First, subjects in the experimental conditions were instructed in the use of the mnemonic-keyword method to remember cities and their products. For example, Lock Haven is famous for making paper, so subjects were instructed to construct an interactive image between a lock and a paper. Directions for each of the experimental conditions varied in terms of degree of explicitness. Following the administration of a recall measure, subjects were instructed in their second task which was to remember a list of Latin words and their translations. Again, the experimental conditions varied in terms of degree of explicitness of directions. For instance, in the complete-instruction condition, S's were again trained in the mnemonic-keyword method to remember the Latin words and their translation. In the general-instruction condition, S's were told to use a technique like the one used to learn the cities and their products. The no-instruction group was told simply to learn the Latin words. Control subjects were not instructed for either task. The performance of S's in the no-instruction condition exceeded the performance in the control condition for the older adolescents, inferring that the older adolescents did transfer the strategy. Although the younger adolescents did not transfer the strategy in the no-instruction condition, there was evidence of transfer in the general-instruction condition. Therefore, it can be concluded that more explicit prompts are needed with younger adolescents to induce the use of the specific strategy.

For educational and practical purposes, it is crucial to note that performance in the no-instruction and general-instruction condition did not equal performance in the complete-instruction condition even at the older age level. Thus, as Pressley and Dennis-Rounds state, "even though transfer effects may be obtained in a new situation when comparison is made to a control condition, maximum performance may be achieved only by reinstructing the learners in strategy usage in the new task situation" (p. 581).

Instructing learners in strategy usage is metastrategy, knowing about strategies, a crucial ingredient if instruction attempts to lead to skills that are more general and better maintained after instruction. The hypothesis regarding meta-strategy is that "the more children know about a strategy, the more likely they will use it on later occasions" (Pressley, Borkowski, & O'Sullivan, 1984, p. 94).

To review, thus far, (1) mnemonic keyword strategies are efficient and effective in enhancing recall performance of nonhandicapped and exceptional learners, (2) specific mnemonic strategies need to be instructed, (3) spontaneous transfer of mnemonic strategies does not occur in students younger than 18 years old, (4) reinstructing strategy usage appears necessary to enhance performance in new task situations, and (5) metastrategy, knowledge about strategies, appears to be crucial for effective strategy deployment.

Thus, in an investigation with learning disabled (LD) adolescents (McLoone, 1985), memory strategy instruction and training were expanded to include the component of experimenter-provided metastrategy. In the first experiment, 60 7th- and 8th-grade LD students were randomly assigned, 30 per condition, to one of two types of memory strategies (mnemonic-keyword versus directed-repetition) for 16 vocabulary words. An example of the mnemonic-keyword method is: "The keyword for <u>ranid</u> is <u>rain</u> and <u>ranid</u> means <u>frog</u>. Remember this picture of a frog in the rain." In the directed-repetition

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*Paper presented at the annual convention of the Council for Exceptional Children, Anaheim, California, April, 1985.

condition, the procedure was a review of flashcards with the vocabulary word and the definition. After the 16 vocabulary words were presented, a recall measure was administered. S's in the mnemonic-keyword condition significantly outperformed S's in the directed-repetition condition with means of 11.73 and 3.96, respectively. Clearly, once again, the mnemonic-keyword condition enhanced recall performance on vocabulary acquisition of LD students.

To extend the memory strategy instruction, Experiment 2 began with feedback and reinforcement of the strategy previously instructed ("You did a good job using that memory strategy for those words").

Additional metastrategy information was provided. For example, S's were told that their particular memory strategy has been used with students of different ages and is particularly effective with junior high, high school, and adult learners when the task is to remember a lot of new information that goes together. All S's were also told that the purpose of the next session was for them to learn to use their particular memory strategy independently. For example, S's in the mnemonic-keyword condition were instructed to think of a keyword, and then to think of a picture of the keyword and the meaning of the vocabulary word doing something together for each word in a new set of words. S's in the directed-repetition condition were instructed in how to repeat and review the flashcards in sets of three. All S's were then given a set of 10 vocabulary words and told to use the strategy just learned independently. A recall measure was administered. Again, S's in the mnemonic-keyword condition outperformed S's in the directed-repetition condition with means of 7.43 and 4.03, respectively. Thus, after a brief training period, LD students in the mnemonic-keyword condition were able to utilize the mnemonic-keyword strategy independently and recall 7 of the 10 vocabulary words.

Although research dealing with instruction, training, and transfer of memory strategies with the LD population is in its infancy, results obtained thus far are promising. Results indicate that strategy training is effective with LD students, and their performance is modified by environmental provision of appropriate strategies. This investigation used procedures that could be easily implemented by special education teachers. And, instruction in memory strategies could lead to improved performance on a variety of memory tasks.

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Extended Mnemonic Instruction*

Debra Tolfa
Utah State University

This study examined the effects of mnemonic instruction (a) to teach three discrete lessons over days, (b) on a vocabulary application task, (c) to teach ordered information via the pegword technique, (d) on an attribute extension to another content area, (e) on delayed recall testing, (f) with learning disabled students, (g) with instruction occurring in small groups, and (h) when compared with a direct questioning technique based on direct instruction (Engelmann, Carnine, et al.)

The content area taught covered dinosaur information. Lesson One taught the meanings for 14 dinosaur word parts; Lesson Two taught 3 attributes for each of 8 dinosaurs--(a) what period the dinosaur lived in, "early," "middle," or "late," (b) if the dinosaur was a "green plant eater" or a "red meat eater," (c) a trait specific to each dinosaur; and Lesson Three taught eight ordered reasons why dinosaurs may have become extinct.

Subjects were sixth, seventh, and eighth grade LD students attending school in rural communities in northern Utah. Students were instructed in groups of two to four during their regular resource room period by either mnemonic instruction techniques or direct questioning instruction techniques. A test followed each of the lessons for days 1, 2, and 3. On day 4 a delayed recall test covering information from the three previous days was administered twice. On the first administration, students were required to produce the correct response, while on the second administration students were presented with all possible responses and were required to identify the appropriate response.

Let's look at some materials from each lesson.

	Mnemonic	Direct Question
Lesson One:		
procedure explained	thero saurus pter.	same same same
Lesson Two:		
procedure explained	Tyrannosaurus Melanorosaurus Allosaurus	v.s.d.
Lesson Three:		
procedure explained	Reason One Reason Four Reason Seven	same same same

Results

The results are described according to the eight previously stated study objectives.

(a) 3 Lessons over days.

Students in the mnemonic condition scored significantly higher on all subtests as well as on the two delayed recall measures.

Since past studies have looked at one-day lessons, it could be thought that after days of instruction, mnemonically instructed students may confuse the images and keywords. However, results from this study indicated that this was not so. No inhibiting effects across days for either condition were found. It should be remembered that each lesson consisted of very different tasks. Because of this it was difficult to assess any possible positive effects of instruction over days (i.e., three vocabulary lessons).

An additional analysis of interlist (giving a response from another lesson) and intralist (giving a response from another item on the same test) intrusions found no interlist intrusions and found that the direct questioning condition students produced significantly more intralist intrusions than did mnemonically instructed students. This is an interesting finding since it has been thought that students instructed via mnemonic techniques may confuse responses.

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*Paper presented at the annual meeting of the Council for Exceptional Children, Anaheim, CA, April 1985.

(b) Application task--Test Two.

This task required students to write the meanings for whole dinosaur names constructed from the word parts taught in Lesson One. When the groups were compared on Test Two, students in the mnemonic condition scored significantly higher than students in the direct questioning condition. This indicated that students instructed via mnemonic techniques not only learned the information better, but overall they applied information they learned better as well.

(c) To teach ordered information.

Lesson Three taught eight reasons why dinosaurs may have become extinct. This was achieved through the use of the pegword technique described previously. This was the first time this technique has been used to teach ordered information. Students in the mnemonic condition remembered about twice as many items as direct questioning condition students.

(d) Attribute to new content area.

As stated, the attribute lesson taught three attributes, 1--dichotomous, 1--continuous, 1--specific for each of the eight dinosaurs. Again, mnemonically instructed students outperformed the control condition students.

(e) Delayed recall testing.

Mnemonically instructed students outperformed direct questioning condition students on both delayed recall tests. Students in both conditions did better on the item identification task than on the item production task.

(f) With learning disabled students.

We are all familiar with the learning and memory problems associated with the LD student. There have been only a few studies conducted teaching LD students via mnemonic instruction. This study replicated the findings of previous studies. LD students in the mnemonic condition outperformed LD students in the the direct questioning condition. Mnemonic instruction continues to be a viable technique for teaching learning disabled students.

(g) Instruction in small groups.

From the vantage point of a classroom teacher, instruction in small groups is desirable over one-to-one instruction. This is only the second study to examine the effects of mnemonic instruction delivered to small groups of LD students. The positive findings of this study, as with the previous study, are promising.

(h) Compare to other techniques.

Thus far, mnemonic instruction has only been compared to direct-instruction-based techniques and a free study condition when teaching LD students. Findings from all studies to date indicate that mnemonically instructed students outperform direct instruction condition and free study condition students. Mnemonic instruction continues to show great promise for the classroom.

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FUTURE APPLICATIONS OF MNEMONICS WITH LEARNING DISABLED STUDENTS*

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As has been described throughout this session, a great deal of research with learning disabled (LD) students has taken place within the past two years. All results to date indicate that LD students:

A. Can successfully learn to use keyword mnemonic strategies.

B. Can learn new vocabulary words.

C. Can learn up to three attributes for specific facts.

D. Can learn the pegword numbering system.

E. Can transfer and apply the keyword strategy under specified conditions.

F. Can learn factual information from prose passages that include keyword mnemonic illustrations.

I am going to present information concerning research projects that are currently either in progress or in the conceptualization stages.

We (myself, Tom Scruggs, Joel Levin, Barbara McLoone, and Chuck Morrison) have just completed the first experiment using "prose" passages with LD high school students. In this experiment, students were tested on their ability to recall factual information that they read silently and independently. The passages they were given to read included either mnemonic illustrations or regular "textbook" type illustrations. Interestingly, the students who read passages containing mnemonic illustrations statistically and substantially outperformed the control students. The materials for Experiment 2 of this investigation are currently being designed. In Experiment 2, we hope to assess "inferential" comprehension skills of LD students after being exposed to materials similar to those used in Experiment 1. We feel that if we can influence LD students' inferential comprehension, in addition to their factual recall, we may really have something important to share with teachers.

We also have plans to prepare studies that will assess the potential of mnemonics in learning mathematical operations and problem solving techniques.

Actually, Shirov Kunihira from Loma Linda University, and Kenichi Machida and Jerry Carlson from the University of California, Riverside, have conducted several investigations in the mathematics content area in Japan. Their techniques are referred to the "POOLS" concepts. These are verbal mnemonics constructed into rhymes that can be sung. Specifically, they have used these verbal mnemonics to teach: (a) monomials and polynomials, and (b) equalities and inequalities. Direct translation of the Japanese into rhyming English is very difficult. Therefore, new materials need to be developed for English-speaking students.

Interestingly, however, all of the Japanese students who were instructed mnemonically have consistently outperformed students taught via other methods. Hopefully, we will be able to test out some of these ideas, and others, empirically in the future.

In summary, I hope you see the potential of maximizing learning of LD students via mnemonic instruction. The research is new, but the results are extremely promising. If you are interested in acquiring more information, please contact us.

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